

A STUDY ON PULMONARY FUNCTION TESTS IN MEDICAL STUDENTS OF KARNATAKA BY USING SPIROMETER

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Abstract

Background: Spirometry is a physiological test that measures the ability to inhale and exhale air relative to time, Spirometry is vital in screening, diagnosing and monitoring of patients in clinical respiratory medicine. Spirometry is a diagnostic test of several common respiratory disorders such as asthma and chronic obstructive pulmonary disease (COPD). It is also instrumental in monitoring the progression of various respiratory disorders. The interpretations of these results depend on comparison with reference values derived from a pool of normal healthy population, which are age, weight, height, gender and ethnicity dependant. **Materials and Methods:** Total 420 number of medical students included in the study. Out of 420 students 210 were male and 210 were female, age group between. All the students with in Only healthy students were included without any health problems. Anthropometric parameters like weight, height, BMI were recorded using standardized procedure. Spirometric parameters such as FEV₁, FVC, FEV₁/FVC ratio, PEFR, FEF_{25-75%} and MVV were recorded. Statistical analysis was performed using SPSS 16.0 for Windows. The t-test was used to test for the difference in measurements between various groups at the level of significance $P < 0.05$. **Result:** The FEV₁ in male was 1.53 ± 0.06 and Female was 1.56 ± 0.04 and there was no significant difference. The FCV(L) male was 1.72 ± 1.02 and Female was 1.73 ± 0.08 and there was no significant difference. The FEV₁/FCV% in male was 88.95 ± 5.88 and Female was 90.17 ± 5.01 and there was no significant difference. The PEFR (L/Sec) in male was 4.21 ± 0.58 and Female was 4.73 ± 0.92 and there was significant difference. The MVV in male was 66.38 ± 12.64 and Female was 72.56 ± 9.76 and there was significant difference. **Conclusion:** Pulmonary function tests are an important tool in the assessment of patients with suspected or known respiratory disease. They are also important in the evaluation of patients prior to major surgery. Interpretation of the tests, which requires knowledge of normal values and appearance of flow volume curves, must be combined with the patient's clinical history and presentation. The present study results may be helpful to clinicians who practice pulmonary medicine.

INTRODUCTION

Pulmonary function tests are an important tool in the investigation and monitoring of patients with respiratory pathology. They provide important information relating to the large and small airways, the pulmonary parenchyma and the size and integrity of the pulmonary capillary bed. Although they do not provide a diagnosis per se, different patterns of abnormalities are seen in various respiratory diseases which helps to establish a diagnosis. The lung

function tests reported from India and other parts of the world exhibit considerable diversity. The appropriateness of a reference value depends on all its features matching those of the person being assessed, like gender, age, absence of disease, measurement protocol, as well as equipment used. So, recent local reference values should be used where these are available.^[1,2] PFTs are affected by factors including diet, obesity, air pollution, and physical activity level. In the last two decades, rapid economic growth and development worldwide has

resulted in an improvement in people's nutritional status. At the same time, air pollution levels have increased and people's physical activity levels have decreased. As such, lung function norms need to be revisited to account for socioeconomic development, environmental factors, and lifestyle changes that influence the normative values even within a single generation within an ethnic group living in the same geographical region. However, in the last five decades, the anthropometric data of young adults have changed significantly owing to factors such as increasing body height and body mass index; therefore, whether previously reported population-specific norms for the prediction of PFTs remain valid is a commonly asked question.^[3-5]

Spirometry is a physiological test that measures how an individual inhales or exhales volumes of air as a function of time, and it is invaluable as a screening test of general respiratory health.^[2] The essential indices of spirometry analysis used in the study are assessing the Forced Expiratory Volume in one second (FEV1), Forced Vital Capacity (FVC), the ratio of Forced Expiratory Volume in one second and Forced Vital Capacity (FEV1/FVC). Differences in pulmonary function in normal people may be due to ethnic origin, physical activity, environmental conditions, altitude, tobacco smoking, age, height, sex, and socioeconomic status. Permanent residents at high altitudes usually have larger lungs than dwellers of comparable stature at lower altitudes. Smoking leads to rapid decline in pulmonary function test specially those indicating diameters of airways such as forced expiratory flow in one second (FEV). In India tobacco kills 8-10 lakh people each year and many of the deaths occur in people who are very young. Here, approximately 5,500 children and adolescents starts using tobacco daily, some as early as 10 years. Teaching about the use of tobacco is essential for college students, both medical and non-medical, because they would be physicians, future teachers and other responsible citizens of the country. So they should not be sanctimonious.^[7-10] The present study was undertaken to determine the lung function parameters in normal young healthy, nonsmoking medical students, to compare the same with the previously reported data and to derive reliable prediction formulae.

MATERIALS AND METHODS

The present study was conducted among MBBS students from different medical institutions in Karnataka Total 420 number of students included in the study. Out of 420 students 210 were male and 210 were female. All the students with in the age group of 18-25 years were requested to participate in the study, irrespective of their sex, ethnicity or socioeconomic status. Only healthy students were included without any health problems. Anthropometric parameters like weight, height, BMI were recorded using standardized procedure. A complete spirogram was performed according to American Thoracic Society (ATS) guidelines by using an expirograph. The test was carried out in a private and quiet room in a standing position. The flow, volume/timed graph were taken out in accordance to the criteria based on the ATS. Spirometry parameters recorded for analysis were forced expiratory volume in 1 second (FEV1), forced vital capacity (FVC), FEV1/FVC ratio, peak expiratory flow rate (PEFR), forced expiratory flow FEF25- 75%. The maximum voluntary ventilation (MVV) was determined by fast, deep breathing for a 10 second period and reported as liters/minute.^[11-15] Statistical analysis was performed using SPSS 16.0 for Windows. Continuous variables were reported as mean \pm standard deviation (SD). The mean for age, height, weight, BMI, FVC, FEV1, PEFR, FEF25-75% and MVV were stratified by gender. The t-test was used to test for the difference in measurements between various groups at the level of significance $P < 0.05$.

RESULTS

In present study we have included the MBBS students of different medical insinuations in Karnataka, we have recorded the anthropometric information such as Age, Height, Weight, BMI, out of all these between male and female subjects height and weight were showing $P < 0.05$, which shows significant difference between male and female participants. Among different anthropometric and pulmonary function parameters mean values for PEFR and MVV were found to be significantly different (<0.05) between male and their female counterparts [Table 1].

Table 1: Shows the comparison of mean values for anthropometric and pulmonary function characteristics between male and female participants.

Parameter	Male	Female	P value
Age	19.82 \pm 1.36	19.76 \pm 2.12	0.42
Height(Cm)	168.24 \pm 10.6	162.58 \pm 11.4	0.005*
Weight(Kg)	68.46 \pm 6.12	62.96 \pm 8.11	0.007*
BMI	23.4 \pm 5.4	22.4 \pm 6.2	0.15
FCV(L)	1.72 \pm 1.02	1.73 \pm 0.8	0.23
FEV1(L)	1.53 \pm 0.06	1.56 \pm 0.04	0.78
FEV1 /FCV%	88.95 \pm 5.88	90.17 \pm 5.01	0.56
PEFR (L/Sec)	4.21 \pm 0.58	4.73 \pm 0.92	0.005*
FEF 25 -75%	2.63 \pm 0.62	2.94 \pm 0.25	0.12
MVV	66.38 \pm 12.64	72.56 \pm 9.76	0.001*

DISCUSSION

Pulmonary function tests are a group of tests that measure how well your lungs work. This includes how well you are able to breathe and how effective your lungs are able to bring oxygen to the rest of your body. The studies conducted used spirometry as the best procedure for finding lung function and was also employed in this study. The present study was conducted with 420 subjects, out of that 210 male and 210 female subjects. Age was distributed in males 19.82+1.36 and females 19.76+2.12, Height (Cm) in males 168.24+10.6 and females it was 162.58+11.4 in height there was significant difference (<0.05). Weight (Kg) in males was 68.46+6.12 and in female was 62.96+8.11, there was significant difference (<0.05). BMI in males 23.4+5.4 and in females 22.4+6.2. The Spirometry parameters FCV(L) in males was 1.72+1.02 and in females 1.73+0.8, the FEV1(L) in male it was 1.53+0.06 and in females 1.56+0.04. The FEV1 /FCV% in males 88.95+5.88 and in females 90.17+5.01. The PEFR (L/Sec) in male was 4.21+0.58 and in females 4.73+0.92, PEFR(L/Sec) shows significance difference (0.005). The FEF 25-75% in males was 2.63+0.62 and in females was 2.94+0.25. The MVV was in males 66.38+12.64 and in females it was 72.56+9.76, it shows significance difference between male and females.

The study Dheeraj Khatri et al,^[9] on 326 subjects who were mostly in the age group of 18-25 years. In their study included 128 males and 198 females in the ratio of 4:6. In their study also comprised of 120 smokers and 206 non- smokers in the ratio of 4:6. Most of the individuals belong to the 20 years of age and no significant correlation with body weight, weight or BMI of the individuals was established in this study. A study conducted by Amit Bandopadhyay,^[16] on pulmonary function test among young Malaysians showed FVC and FEV1 exhibited significant correlation with body height and body mass among males whereas in the female group FVC and FEV1 exhibited significant correlation with body mass, body weight and also with age. Our study results also in corelation with Amit Bandopadhyay study.^[16] In the study of Dheeraj Khatri et al,^[9] also aimed at finding differences in lung functions between 164 individuals belonging to the North Eastern States of the country and 162 individuals belonging to the Rest of the Country and also Non-Residential of India. The study groups were age matched Mean weight and BMI was higher among people from the rest of the country when compared to Northeast though not significant. A study conducted by Buvana et al on racial influence on pulmonary function test in Indian and Nigerian Students showed significant difference in the FEV1, FVC and FEV1/FVC values among the two groups where lung functions among Nigerians was better than the Indian population.^[17]

Amit Bandyopadhyay study,^[5] FEV1% and PEFR recorded. The variation in FEV1% and PEFR was

indicative of the changes in those parameters in university students of Kolkata over the last 24 years. In Amit Bandyopadhyay study,^[5] explanation is that pulmonary function variables are directly proportional to a subject's body height, which is significantly higher. Furthermore, with the improvement in socioeconomic status as well as continuous health promotion campaigns organized by the governmental and non-governmental sectors, it may be expected that the health status of the studied population has improved in the last 24 years. In study of Amit Bandyopadhyay,^[5] the pulmonary function measurements showed similar as our study. The specific reason for the existence of differences in pulmonary function variables in different healthy populations is uncertain, although they may be attributable to sociodemographic factors, e.g. ethnicity, habitat, and anthropometric characteristics.^[16] FVC and FEV1 values were similar with Amit Bandyopadhyay^[5] study and higher than previously reported values among Malaysians.^[18,19] Such a difference might be attributed to the variation in habitat, ethnicity, and sociodemographic nature. VC, FVC, FEV1, FEV1%, and PEFR exhibited significant correlation with age and body height.^[20]

CONCLUSION

With our study results it can be concluded that the pulmonary function of the medical students of Karnataka is within the normal range. Pulmonary function tests are an important tool in the assessment of patients with suspected or known respiratory disease. They are also important in the evaluation of patients prior to major surgery.

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